



Systems for Handling and Managing Data for Surveillance of Communicable Diseases

IDA L. SHERMAN, M.S.

THE SYSTEM of collecting and managing morbidity reports at the National Communicable Disease Center is a tightly organized manual operation that has evolved from more than 50 years of experience within the Public Health Service. Of recent origin are the surveillance programs which stemmed from the need for detailed data essential for developing methods of controlling and eventually eradicating certain diseases. The data collected by the Center are published in two kinds of reports: (a) the *Morbidity and Mortality Weekly Report* which contains information within the public domain, and (b) surveillance reports on specified diseases which are distributed to agencies and persons directly concerned with these diseases.

The two systems of collecting morbidity and surveillance data are interrelated, and they require both medical and statistical personnel. The weekly reports provide current information on number of cases reported, accounts of epidemics, reports of unusual incidence of communicable diseases, current trends, and recommended immunization schedules for various vaccines. The surveillance reports are based on field investigations of reported cases of specified diseases.

The morbidity and surveillance data originate

Miss Sherman is acting chief of the Statistics Section, Epidemiology Program, National Communicable Disease Center, Public Health Service, Atlanta, Ga.

with private practitioners and are supplemented by investigations by epidemiologists, laboratory tests, and reports from school nurses, public health nurses, sanitarians, and other specialists, and are funneled through local and State health departments to the Center. Although the number of cases reported falls short of complete coverage, and case reports may contain imprecise (but not inaccurate) data, these reports constitute the only effective instrument in the United States for monitoring diseases that may threaten the health of the public. The system by which these reports reach the Center is described in the *Manual of Procedures for National Morbidity Reporting*, which is revised periodically according to recommendations of the Conference of State and Territorial Epidemiologists.

The remainder of this discussion is on the mechanics of how the data are handled at the National Communicable Disease Center to provide the basic information for the weekly reports, the annual summary of reported incidence of notifiable diseases in the United States, the surveillance reports, and to answer the numerous inquiries received annually.

Notifiable Disease Data

Each week, each State sends a telegraphic report of cases of notifiable diseases and 122 cities send airmail post card reports of mortality to the Center's Epidemiology Program

Statistics Section. The reporting week ends on Saturday; thus, every Monday morning the telegrams and post cards start arriving with data for the preceding week.

All the telegrams and mortality cards, due by noon on Tuesday, are edited and entered successively by two persons on two identical worksheets. The reasons for preparing two worksheets are: (a) two copies must be available by the end of the day on Tuesday, one for the copy preparation unit to set type for the Morbidity and Mortality Weekly Report and one for the chief of the epidemiology program, and (b) errors in drawing totals are quickly detected if the totals on the two sheets do not agree.

While editing, the statistical assistants make note of suspected large values and of reports of rare diseases, such as rabies in man. They compare each suspected high figure with the weekly returns from the reporting State for previous weeks in the current year and for the same week in prior years. If the figure is unusual, the wire service is first asked to confirm the reported number. If it is confirmed, the medical officer in charge of surveillance of the particular disease is notified.

The surveillance officer may already have information on the increased incidence and be at work with the State epidemiologist on an epidemic report for the week's issue of the morbidity report. In the event that the surveillance officer does not know, he telephones the State epidemiologist for information that the State may have available. If, as sometimes happens, the unusual incidence was due to clerical error—transposed digits or entries in the wrong column—in the State health department or wire service, the officer transmits this information to the Statistics Section so that the reported number can be corrected.

If any telegrams or mortality cards have not been received from regular reporters by noon Tuesday, personnel in the Statistics Section telephone the State or city and usually obtain the information. Exceptions are due to illness of key clerical personnel, State holidays, or other unforeseen circumstances. By 4:30 Tuesday afternoon, the worksheets are delivered to the copy preparation unit of the publications management office. By 10:30 a.m. Wednesday, the camera-ready copy is ready for proofreading

by the same persons who prepared the tables in the Statistics Section. In the meantime, charts and graphs have been drawn, the narrative portion of the Morbidity and Mortality Weekly Report has been written by medical personnel and edited and tailored to fit available space by a technical writer, and all copy has been checked by the chief of the epidemiology program. The copy is ready for the printer by 4 p.m. Wednesday, and the printed issues of the weekly report are addressed and delivered to the post office by 4 p.m. Thursday.

The operations involved in preparing the weekly report may soon be computerized. The National Communicable Disease Center has a newly established computer center, and at present it is converting programs previously processed by automatic tabulating equipment.

In the Statistics Section the work of transcribing the data from telegrams to notebooks begins Wednesday afternoon and is finished by noon Thursday. The notebooks consist of pre-printed forms for entry of the number of reported cases by week, by disease, by State, and by major U.S. geographic divisions, plus a cumulative total incorporating current corrections such as additions from delayed reports or deletions of misdiagnoses. The mortality post cards are coded for card punching. These data, in conjunction with similar data for the previous 4 years, are used primarily to compute the expected number of deaths due to pneumonia-influenza during the influenza season which begins in mid-September.

The remainder of the week is devoted to preparing background materials, such as tables, charts, and graphs, for forthcoming features in the Morbidity and Mortality Weekly Report on current trends and surveillance summaries.

Preparation of the annual summary of reported incidence of notifiable diseases as a supplement to the weekly report begins in November, when final report forms are sent to each State health department. The 60-page supplement devotes some 25 pages to tabular material and the rest to charts, graphs, and maps illustrating the trends of the various communicable diseases.

The final report forms for the preceding calendar year are due at the Center no later than May 1. The 4-month interval is designed

to permit the States to correct preliminary data—delete misdiagnosed cases, add delayed reports, correct month of occurrence, and so forth. Again, using worksheets, the statistical assistants collate the materials for the copy preparation unit and illustrators prepare the charts and graphs. Camera-ready copy is usually available by late August for publication in late September.

Surveillance Data

The specified diseases under surveillance in collaborating cities and States are diphtheria, tetanus, salmonellosis, and shigellosis; malaria and trichinosis; encephalitis, hepatitis, influenza, and poliomyelitis; brucellosis, psittacosis, and rabies in man and animals; measles, mumps, and rubella (when outbreaks occur); and leukemia. Surveillance reports are received from

the field by medical officers responsible for specific disease control programs. They review the forms and transmit them to the Statistics Section where they are edited and coded for card punching. The basic summaries specified by the medical officers are prepared on machine equipment. A duplicate set of punched cards is returned to the Statistics Section. Using a sorter with a counting unit and a printing card punch, medical officers assisted by statistical assistants and statisticians analyze the data. Information derived from surveillance case forms eventually appears in the published surveillance reports.

I have not discussed case reports of tuberculosis and venereal diseases because the data are collected by their respective programs. The data for these diseases are based not only on information from physicians, but also on required reports from laboratories and intensive casefinding activities.

Computerizing Children's ECG's

A test for heart disorders in babies and children is being developed by the Public Health Service's National Center for Chronic Disease Control. The test uses a modified version of a successful computer program for adult electrocardiograms (ECG). The computer's greatest value should be in helping to define precisely the normal child's ECG and in increasing the accuracy of the test in clinical situations.

Because the heart changes so rapidly during the months after birth, the ECG of a normal child varies greatly with his age. What is normal for a newborn infant may be quite abnormal for a 2-year-old child. Children with severe heart disease and infants who die of heart disease often have ECG's that are normal by present-day standards.

Each year an estimated 20,000 babies with congenital heart disease are born in the United States. Deaths among these babies most often occur during the first month of life. In addition, from one to two of every 1,000 children of school age have undetected heart disease.

The pediatric ECG has been a potentially valuable detection tool, but children's ECG's are difficult to take and require considerable time and effort. The number of recordings needed to establish normal ECG standards against which to measure the child with heart disease are of such magnitude that most investigators hesitate to use the ECG.

While the computer will not lessen the time and patience needed for the collection of children's ECG's, its ability to analyze data can be used to improve the test's diagnostic standards.

At the present time the computer is being used to analyze the ECG's of children ranging in age from 1 month to midteens. Once precise normal ECG standards have been clearly established, it will be possible to screen for heart disease in these age groups. If the pediatric ECG is eventually incorporated into a comprehensive screening program, the potential for the earliest detection of heart disease will be greatly enhanced.